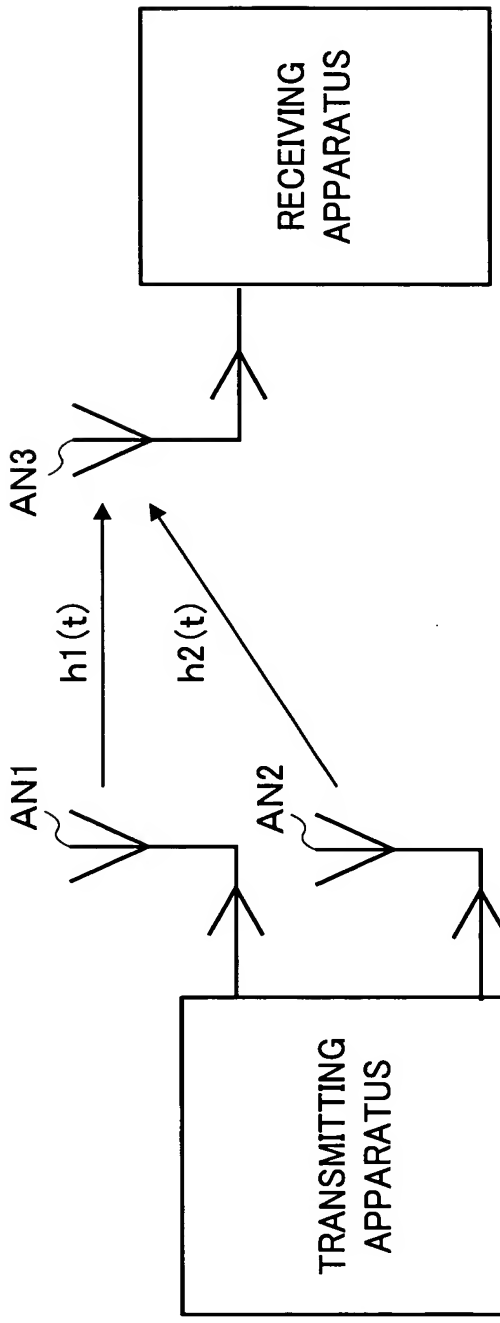
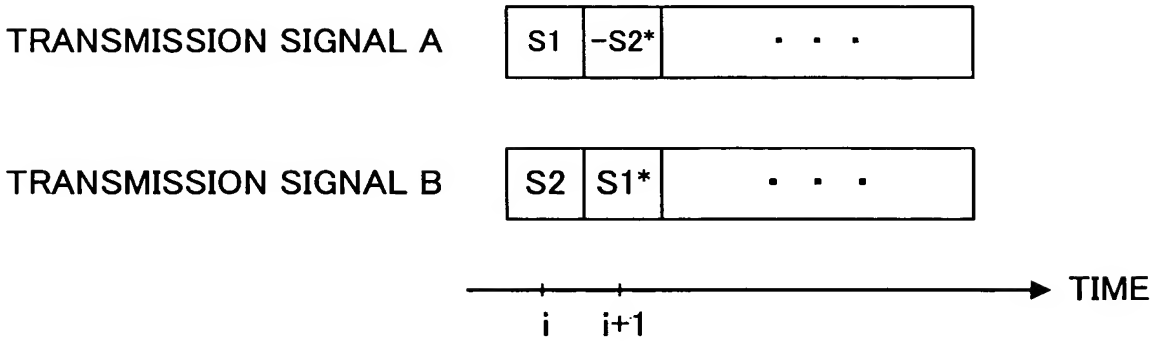


PRIOR ART

FIG.1



PRIOR ART

FIG.2

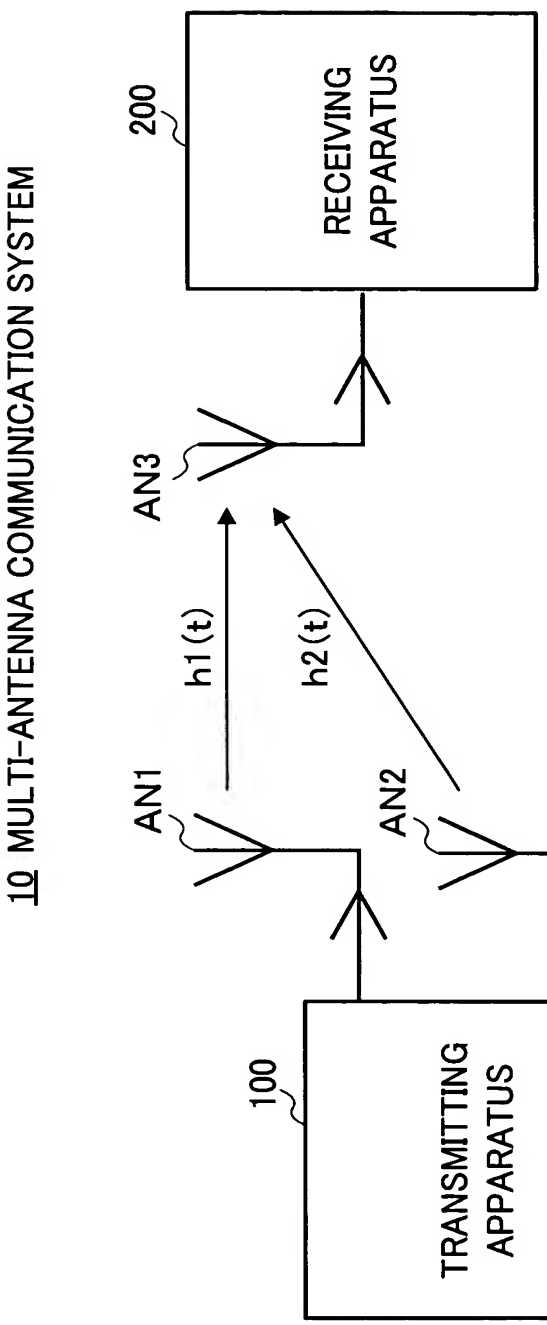

10 MULTI-ANTENNA COMMUNICATION SYSTEM
100
TRANSMITTING APPARATUS
AN1
AN2
AN3
h1(t)
h2(t)
200
RECEIVING APPARATUS

FIG.3

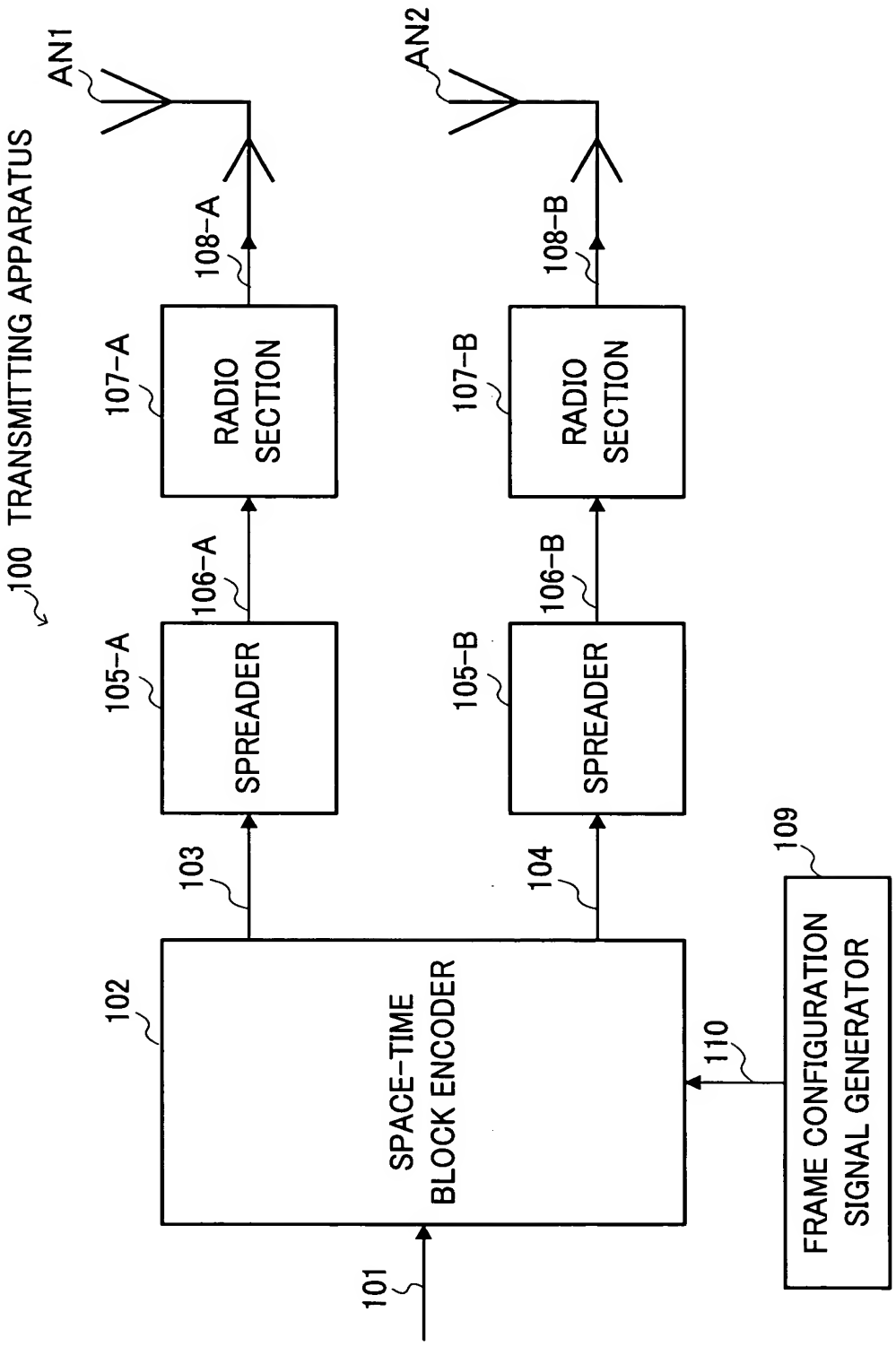

100 TRANSMITTING APPARATUS
AN1
AN2
108-A
108-B
107-A
107-B
RADIO SECTION
RADIO SECTION
106-A
106-B
105-A
105-B
SPREADER
SPREADER
103
104
102
SPACE-TIME BLOCK ENCODER
101
110
109
FRAME CONFIGURATION SIGNAL GENERATOR

FIG.4

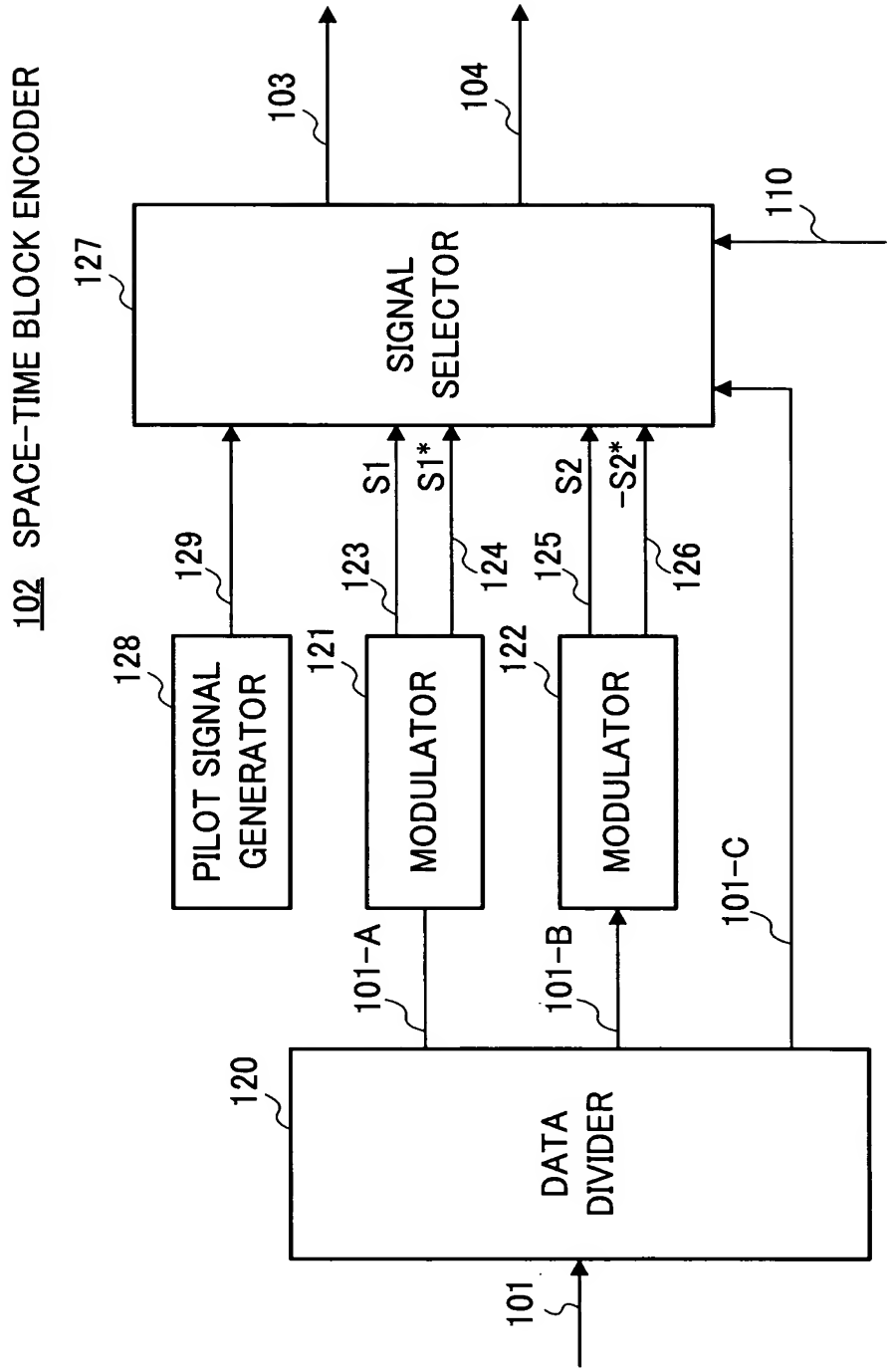

102 SPACE-TIME BLOCK ENCODER
101
DATA DIVIDER
120
101-A
101-B
101-C
MODULATOR
121
MODULATOR
122
PILOT SIGNAL GENERATOR
128
129
123
124
125
126
S1
S1*
S2
-S2*
SIGNAL SELECTOR
127
110
103
104

FIG.5

FIG.6A

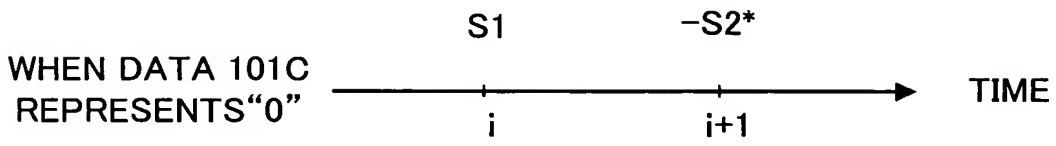


FIG.6B

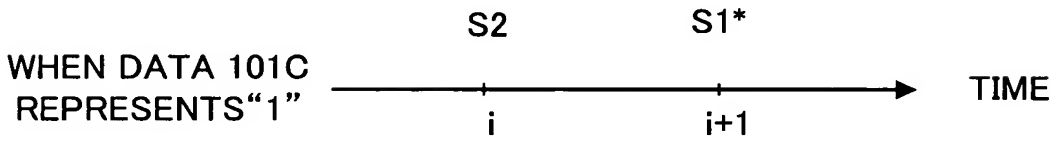


FIG.7A

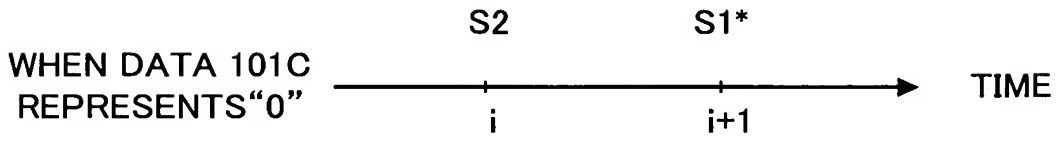


FIG.7B

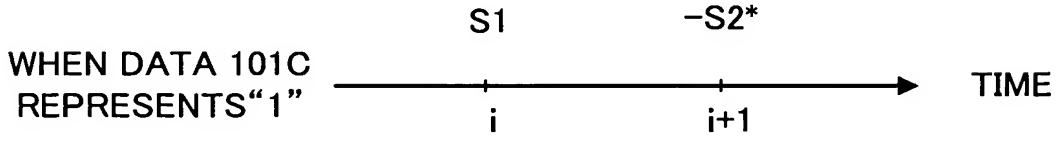


FIG.8A WHEN DATA 101C REPRESENTS"0"

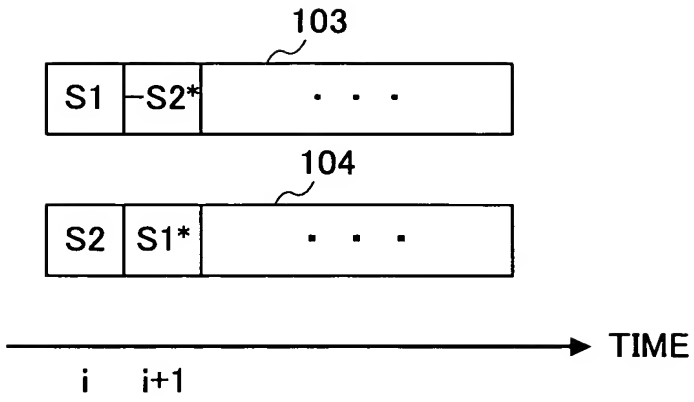
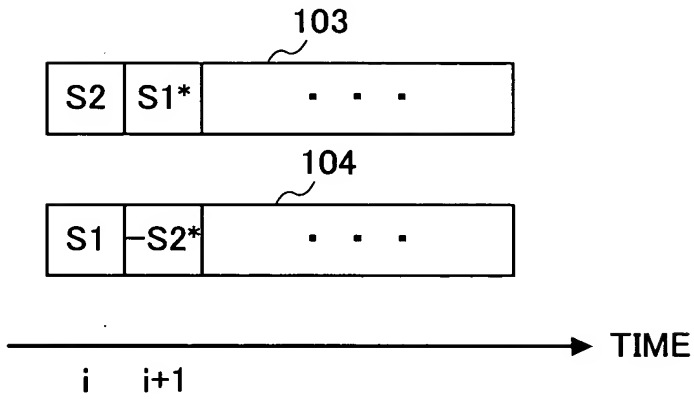


FIG.8B WHEN DATA 101C REPRESENTS"1"



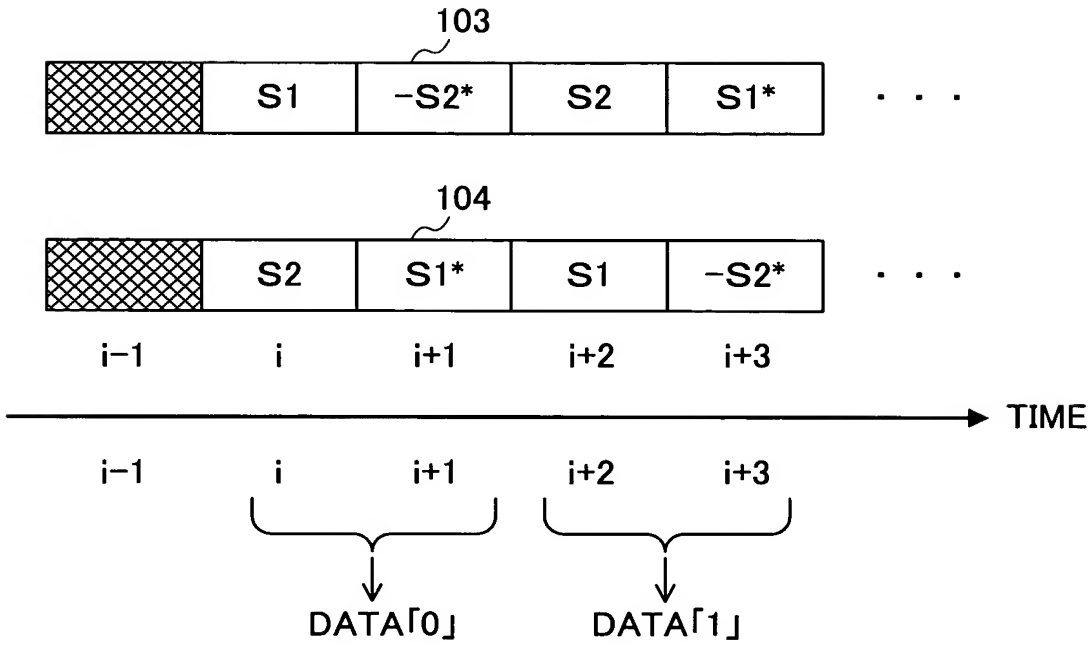

103
S1
−S2*
S2
S1*
104
S2
S1*
S1
−S2*
i−1
i
i+1
i+2
i+3
TIME
i−1
i
i+1
i+2
i+3
DATA「0」
DATA「1」

FIG.9

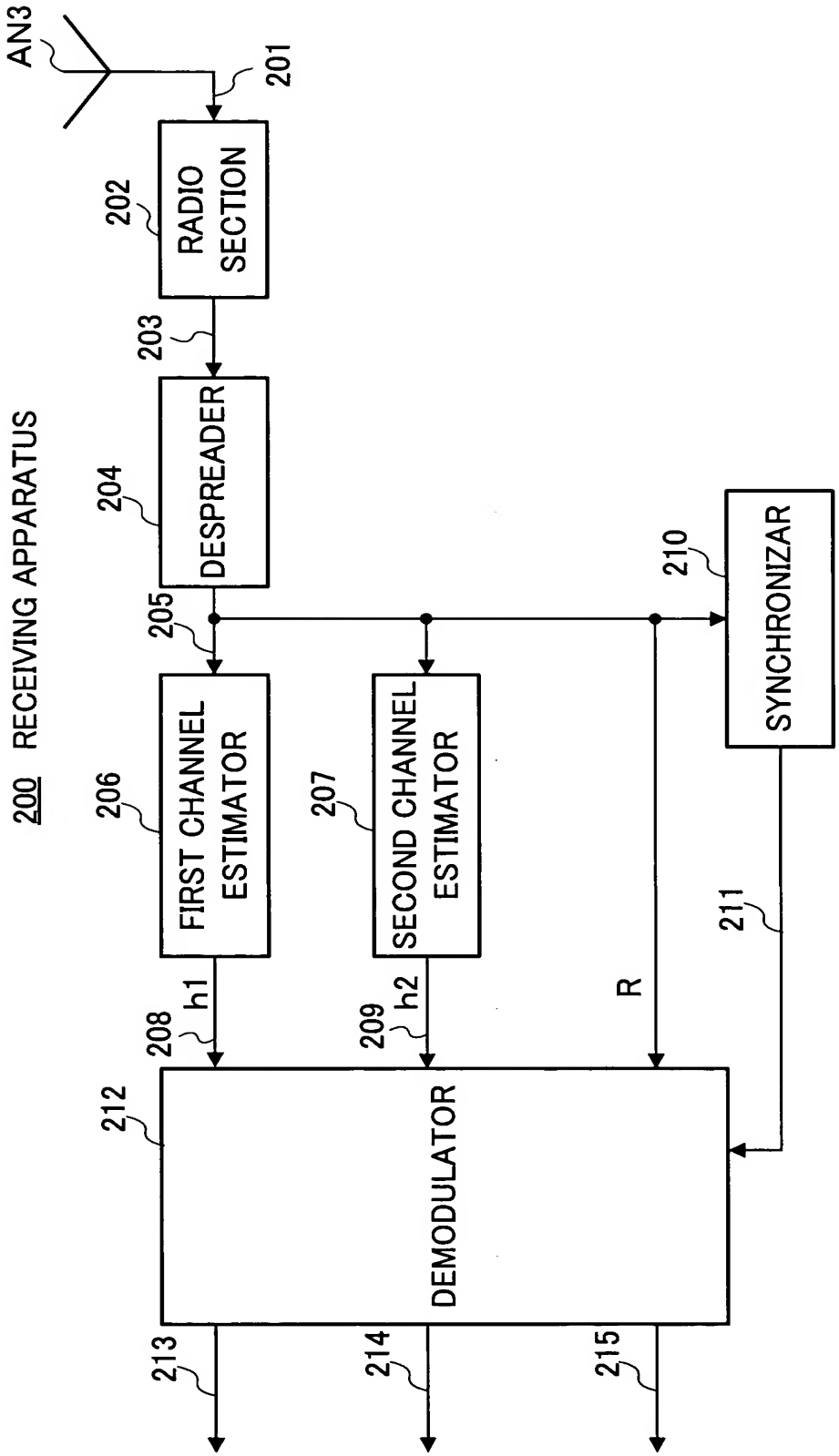

200 RECEIVING APPARATUS
AN3
201
RADIO SECTION
202
203
DESPREADER
204
205
FIRST CHANNEL ESTIMATOR
206
SECOND CHANNEL ESTIMATOR
207
SYNCHRONIZAR
210
211
h1
208
h2
209
R
DEMODULATOR
212
213
214
215

FIG.10

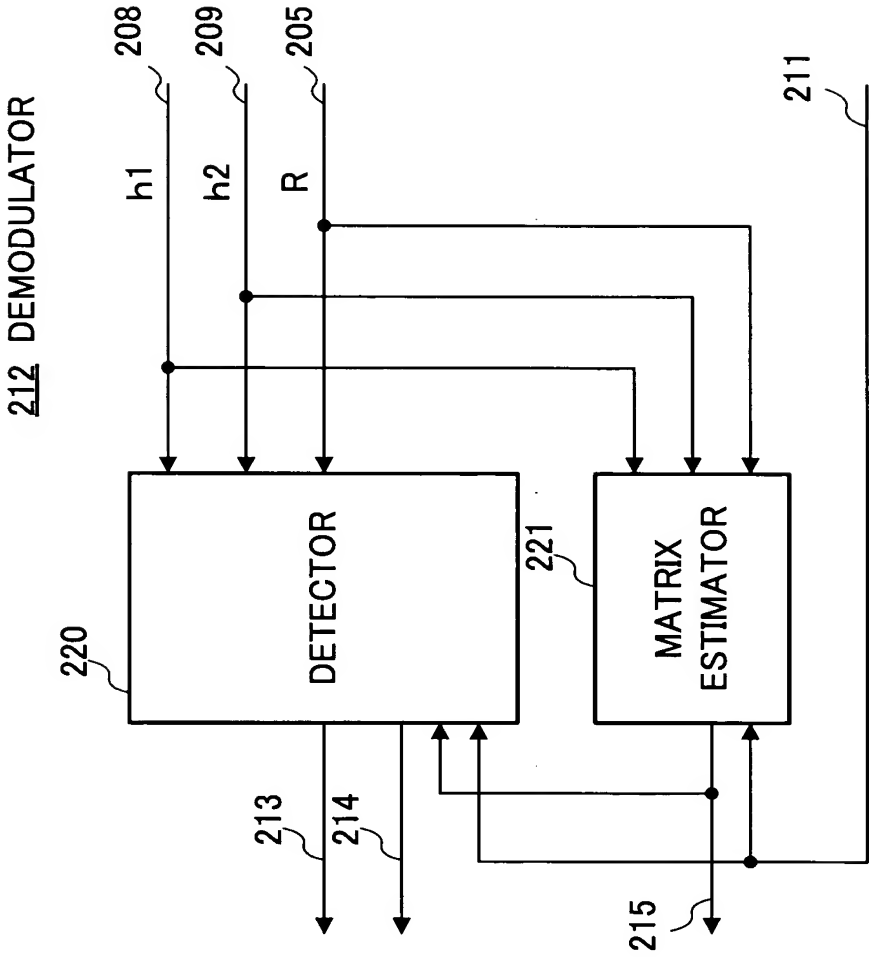

212 DEMODULATOR
208
209
205
211
h1
h2
R
DETECTOR
220
221
MATRIX
ESTIMATOR
213
214
215

FIG.11

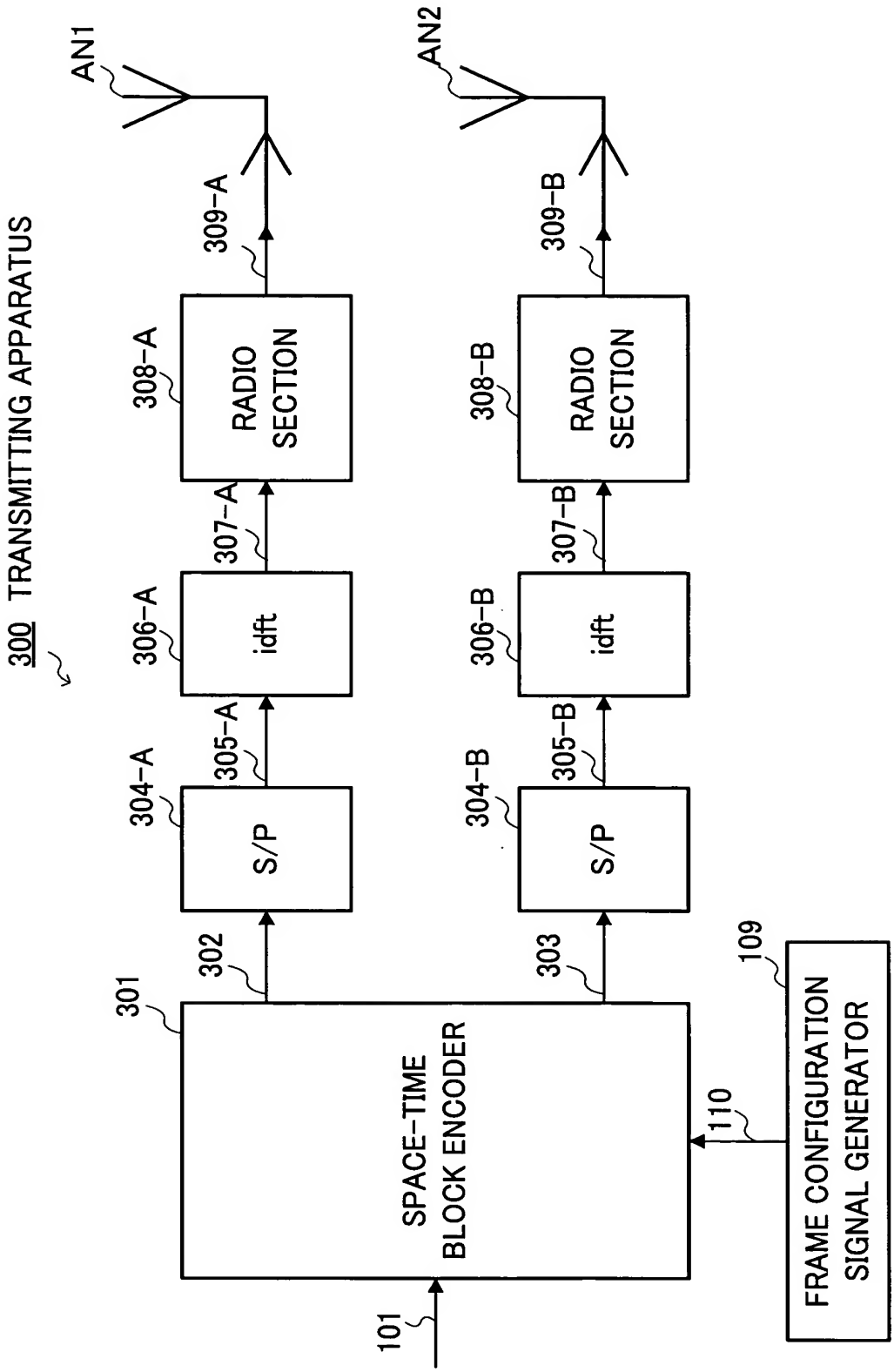

300 TRANSMITTING APPARATUS
AN1
AN2
309-A
309-B
308-A
308-B
RADIO SECTION
RADIO SECTION
307-A
307-B
306-A
306-B
idft
idft
305-A
305-B
304-A
304-B
S/P
S/P
302
303
301
SPACE-TIME BLOCK ENCODER
101
110
109
FRAME CONFIGURATION SIGNAL GENERATOR

FIG.12

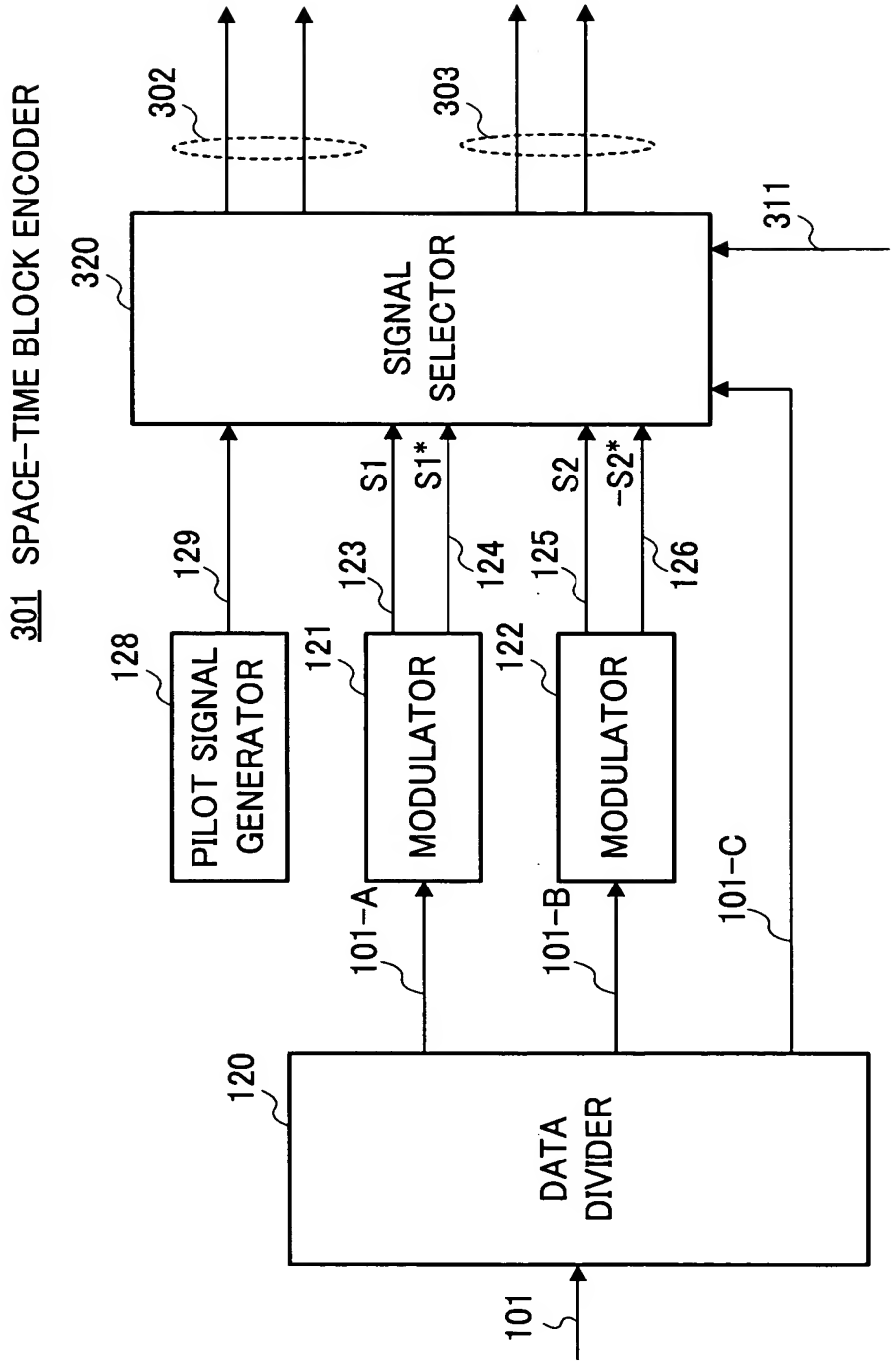

301 SPACE-TIME BLOCK ENCODER
302
303
320
SIGNAL SELECTOR
311
S1
S1*
S2
-S2*
129
123
124
125
126
128
121
122
PILOT SIGNAL GENERATOR
MODULATOR
MODULATOR
101-A
101-B
101-C
120
DATA DIVIDER
101

FIG.13

FIG.14A

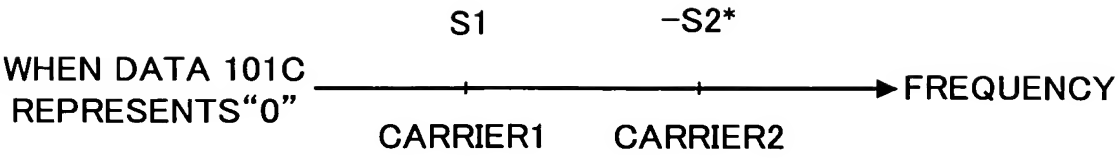


FIG.14B

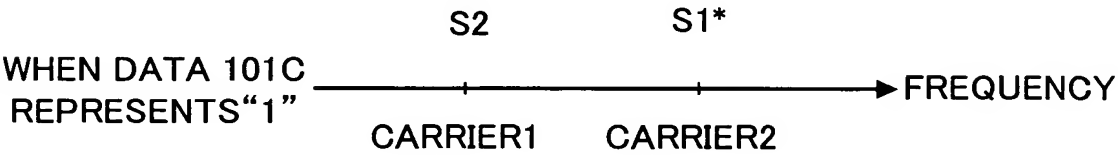


FIG.15A

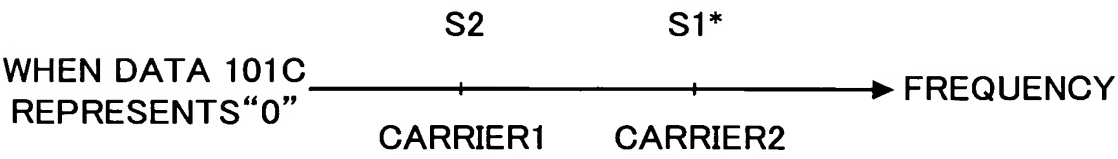


FIG.15B

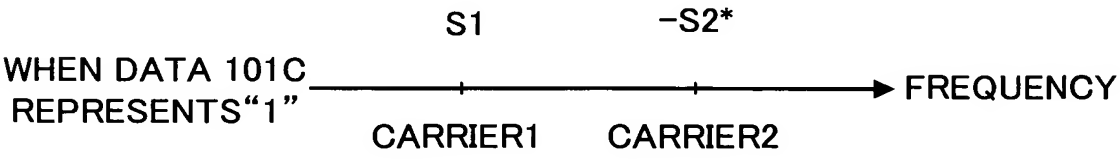


FIG.16A

WHEN DATA 101C REPRESENTS"0"

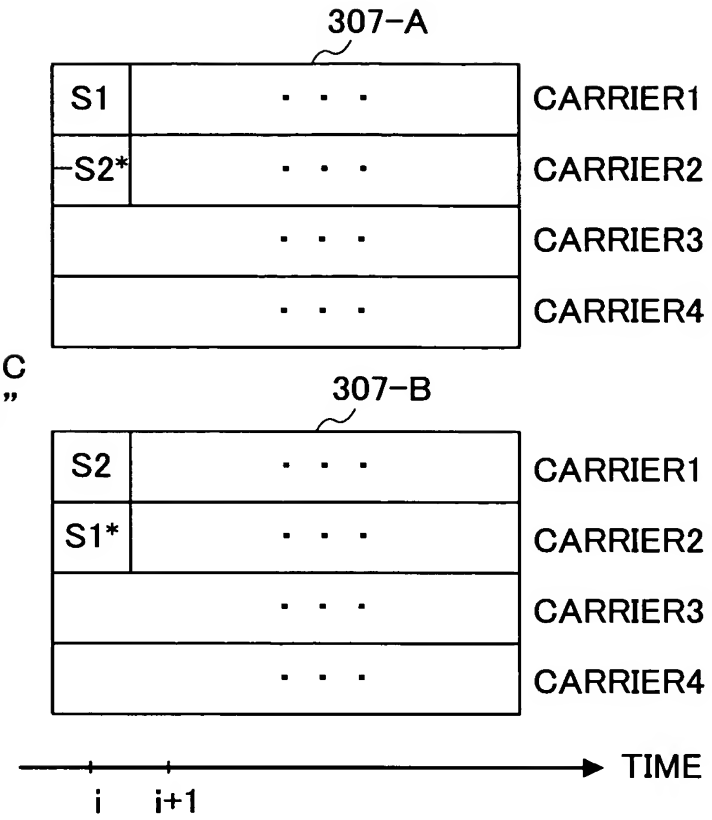
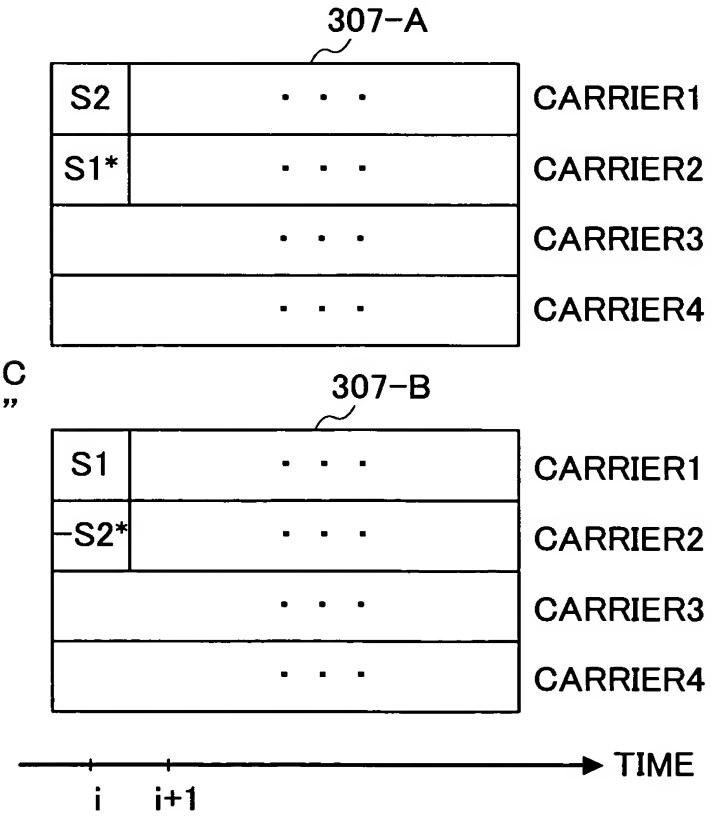


FIG.16B

WHEN DATA 101C REPRESENTS"1"



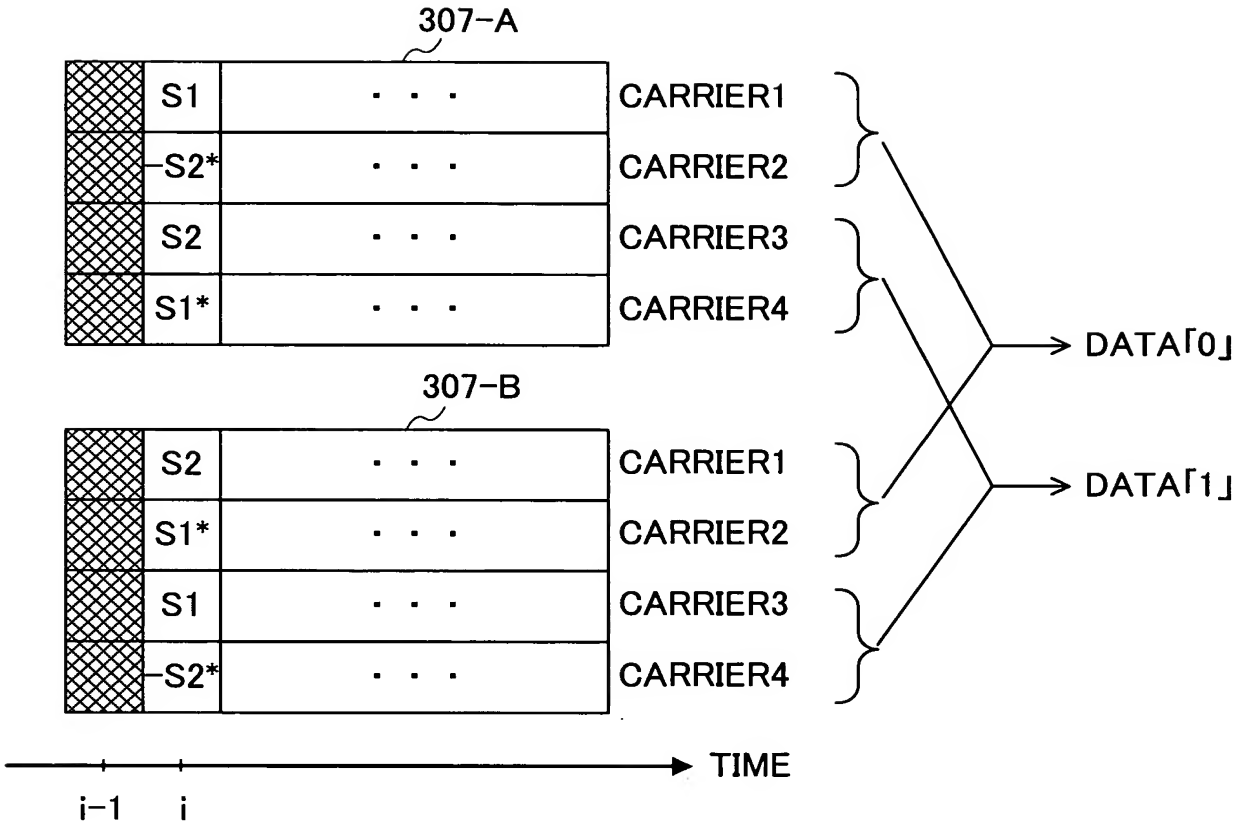

307-A
S1
S2*
S2
S1*
CARRIER1
CARRIER2
CARRIER3
CARRIER4
307-B
S2
S1*
S1
S2*
CARRIER1
CARRIER2
CARRIER3
CARRIER4
DATA「0」
DATA「1」
TIME
i-1
i

FIG.17

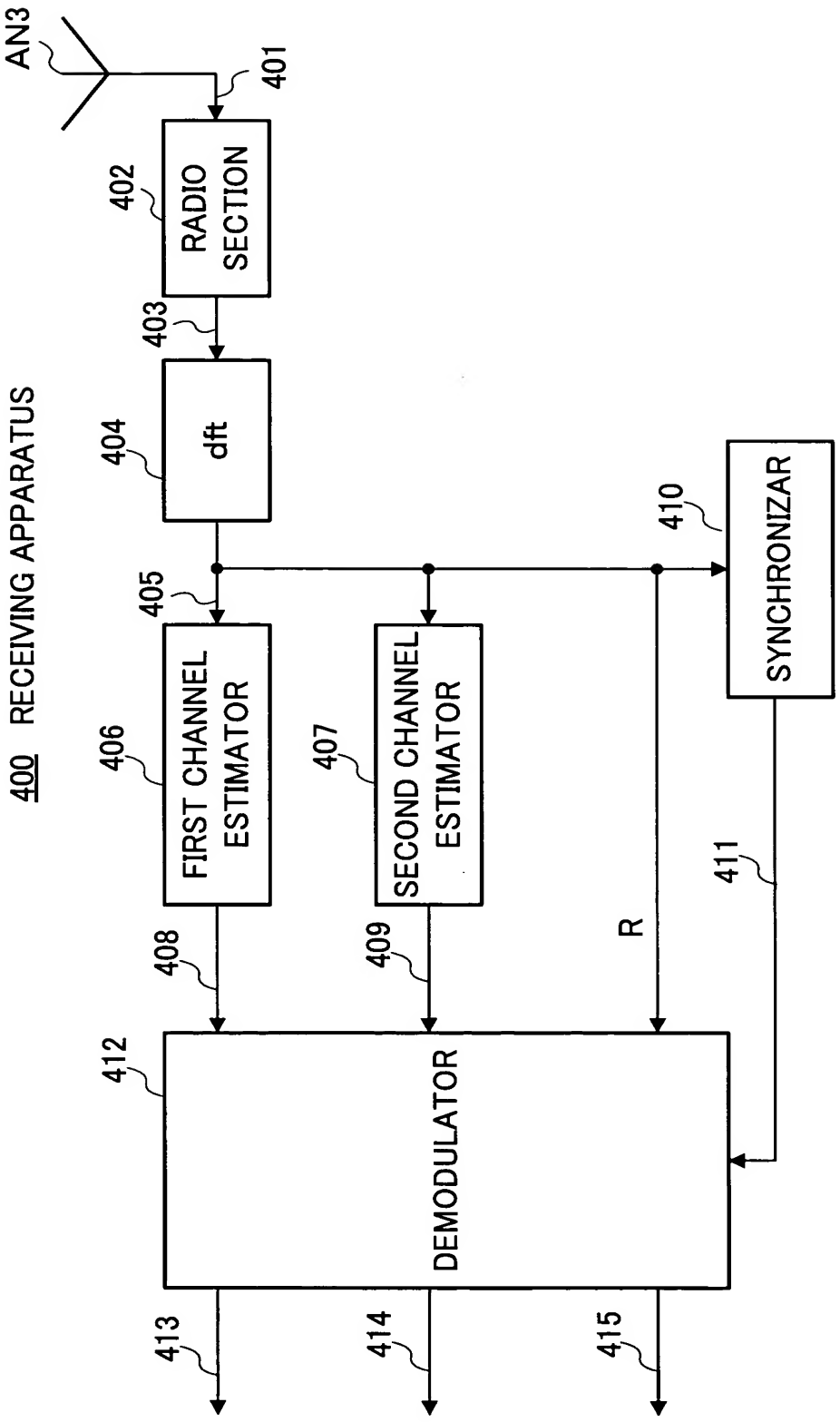

400 RECEIVING APPARATUS
AN3
401
RADIO SECTION
402
403
dft
404
405
FIRST CHANNEL ESTIMATOR
406
SECOND CHANNEL ESTIMATOR
407
408
409
R
410
SYNCHRONIZAR
411
412
DEMODULATOR
413
414
415

FIG.18

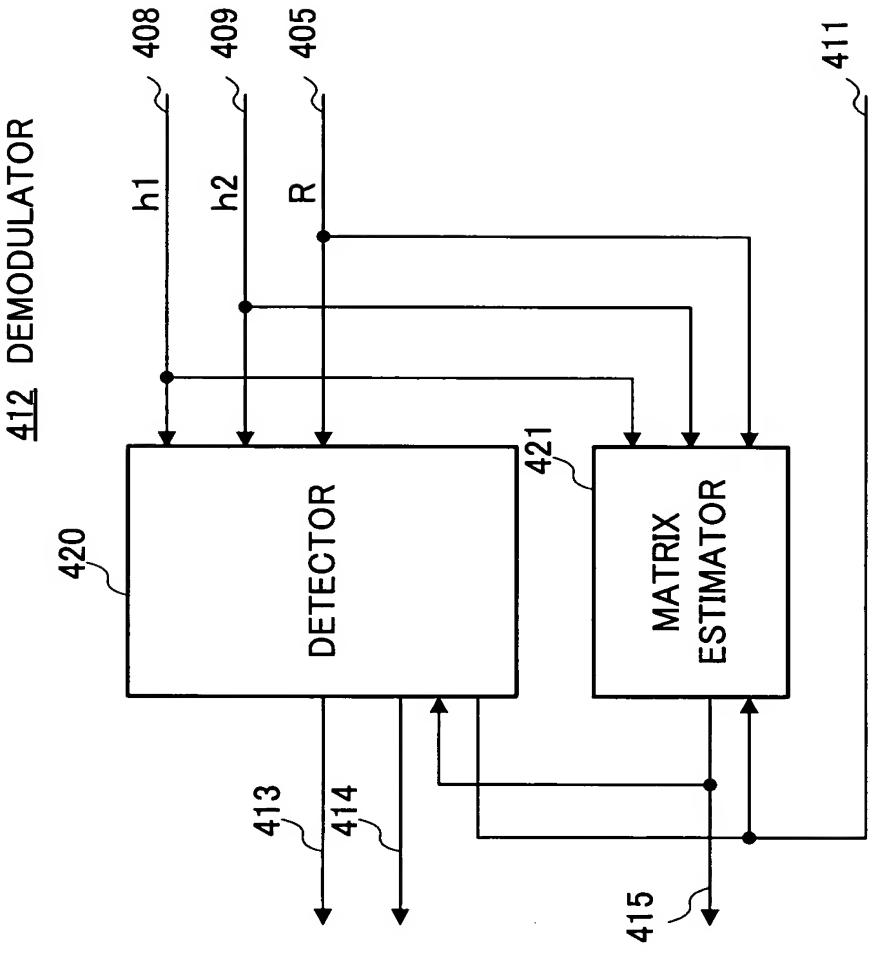

412 DEMODULATOR
408
409
405
411
h1
h2
R
420
DETECTOR
421
MATRIX ESTIMATOR
413
414
415

FIG.19

FIG.20A

WHEN DATA 101C REPRESENTS"0"

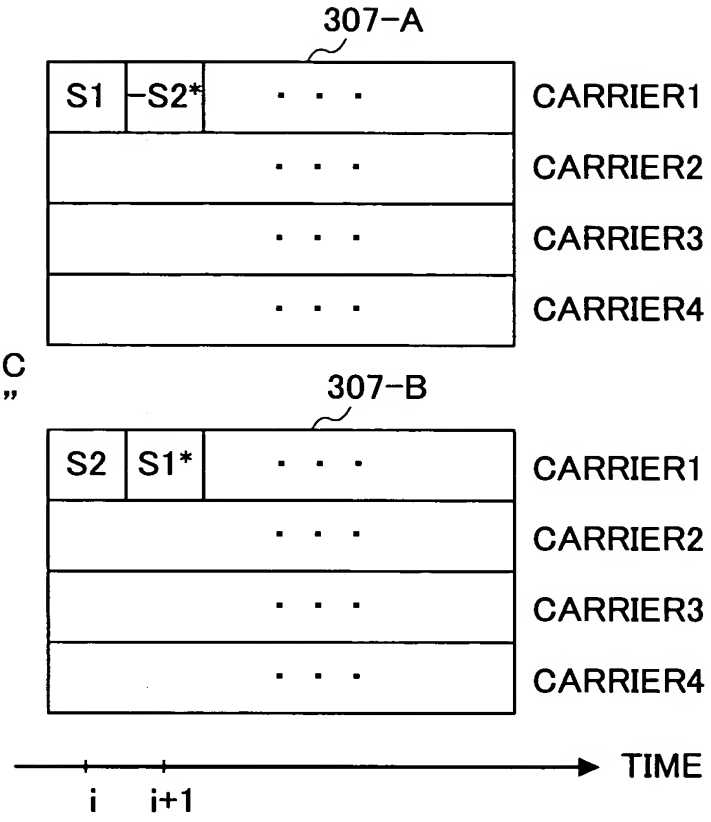
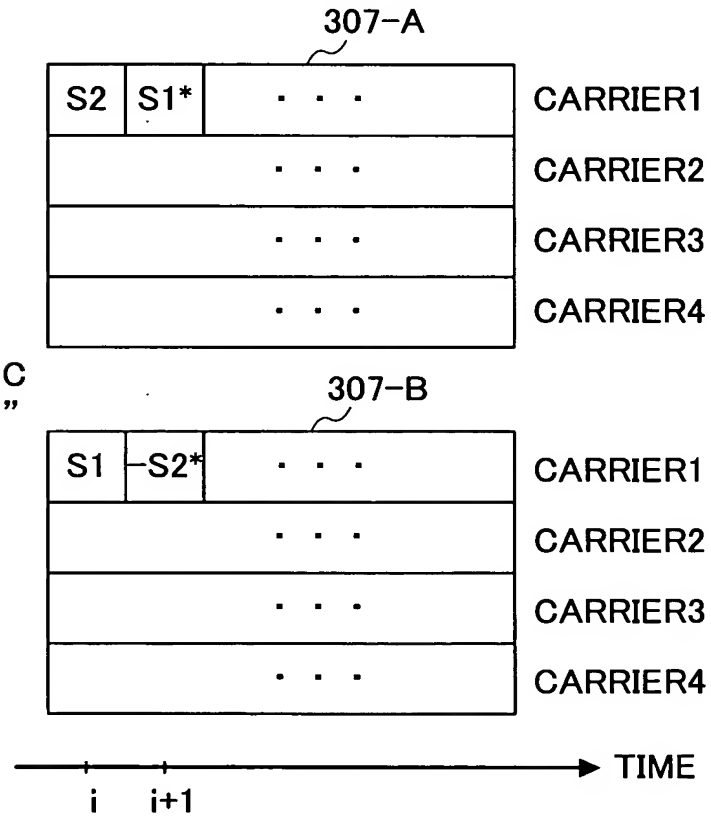


FIG.20B

WHEN DATA 101C REPRESENTS"1"



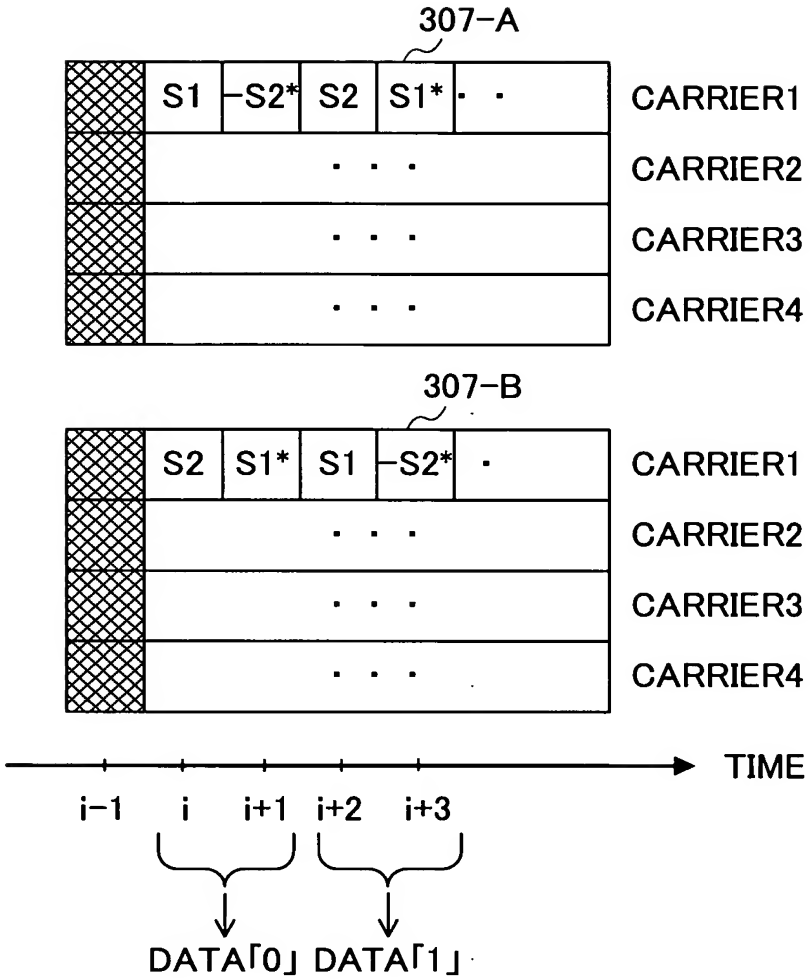

307-A
S1
S2*
S2
S1*
CARRIER1
CARRIER2
CARRIER3
CARRIER4
307-B
S2
S1*
S1
S2*
CARRIER1
CARRIER2
CARRIER3
CARRIER4
TIME
i-1
i
i+1
i+2
i+3
DATA「0」
DATA「1」

FIG.21

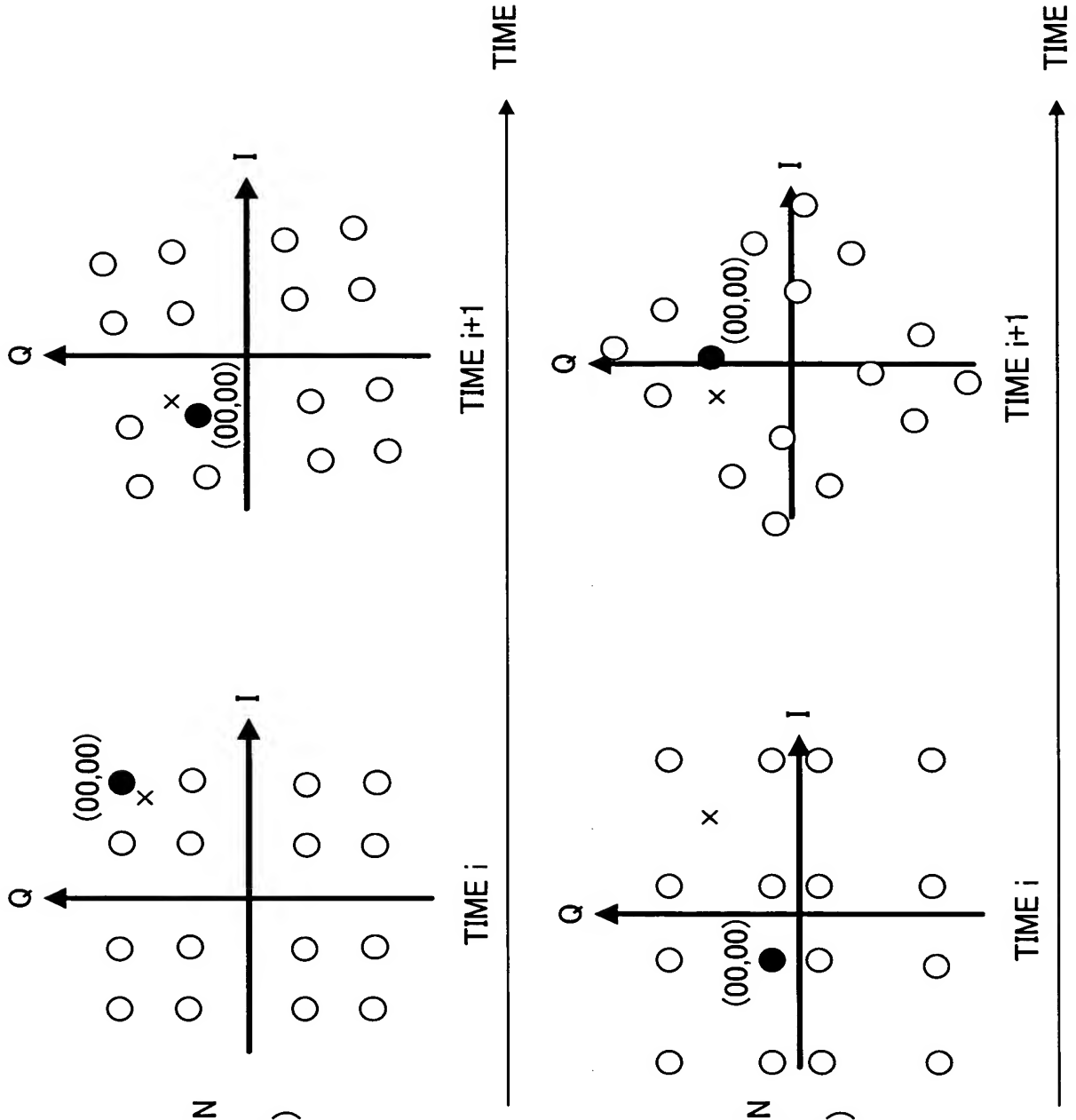


FIG.22A

FIG.22B

FIG.23A

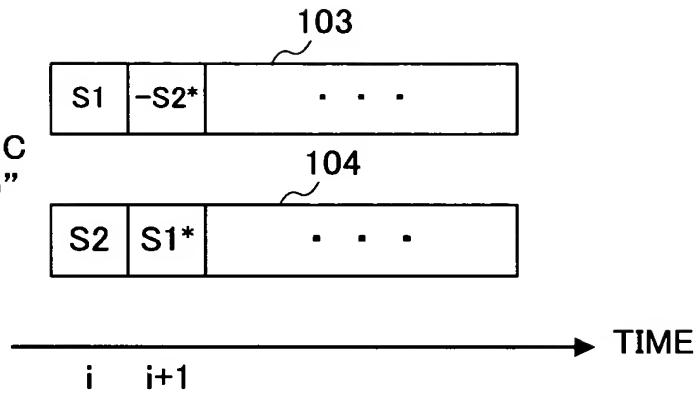
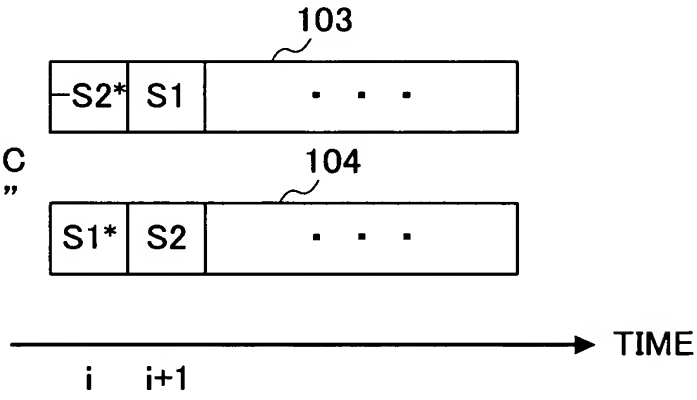


FIG.23B



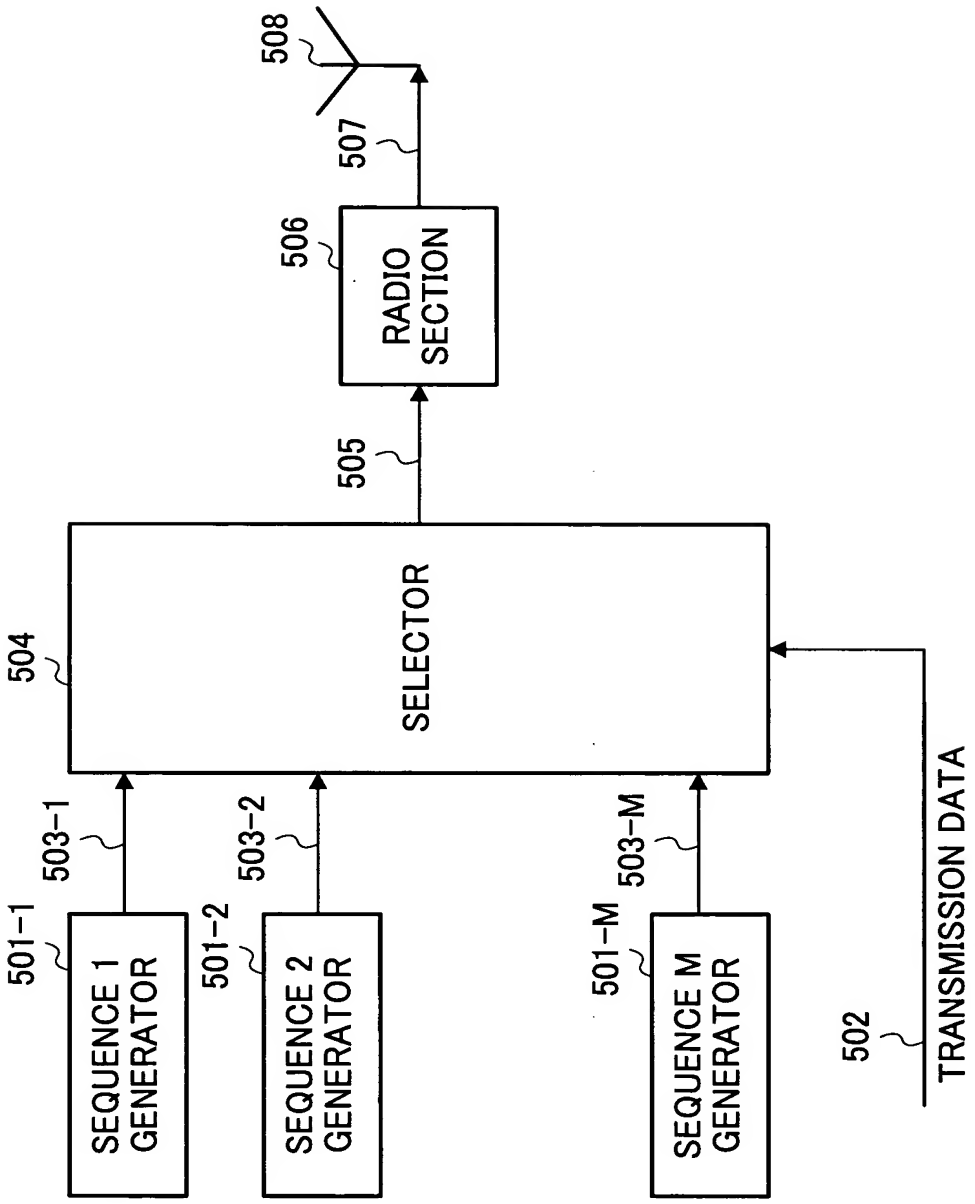

508
507
506
RADIO SECTION
505
504
SELECTOR
503-1
503-2
503-M
501-1
501-2
501-M
SEQUENCE 1 GENERATOR
SEQUENCE 2 GENERATOR
SEQUENCE M GENERATOR
502
TRANSMISSION DATA

FIG.24

FIG.25A

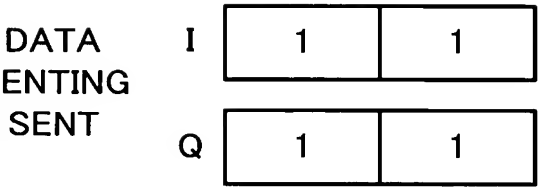


FIG.25B

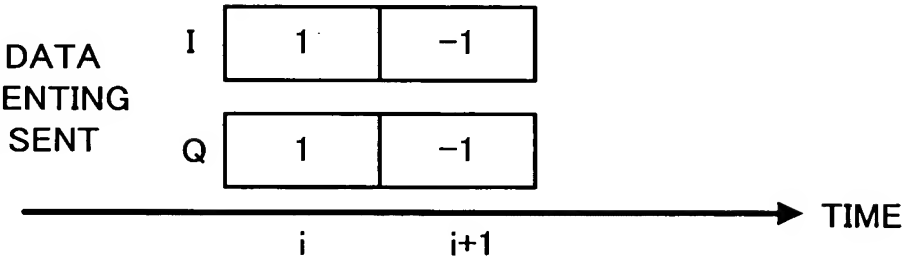


FIG.26A

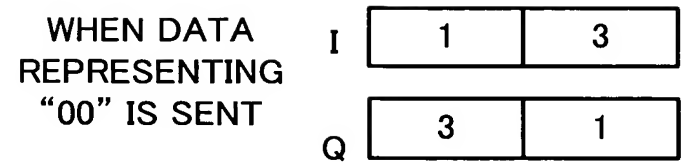


FIG.26B

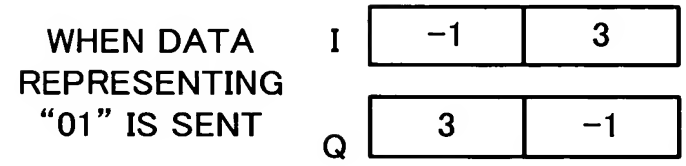


FIG.26C

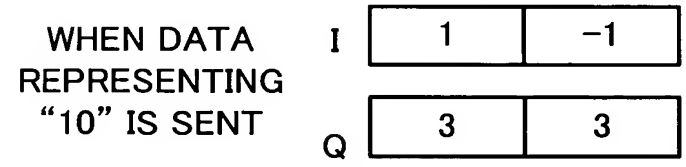
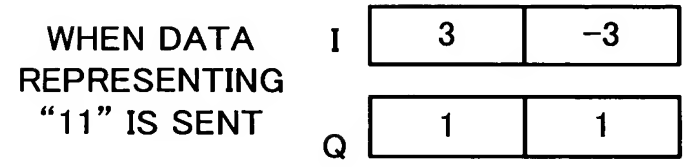
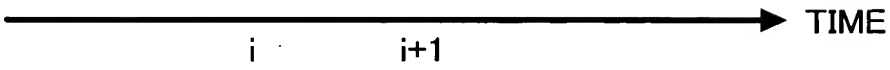


FIG.26D





i i+1